

Lean Genes More Weighty Than Fat Genes

The rationale for blaming body fat entirely on your genes is getting slimmer and slimmer, according to new findings at the Jean Mayer USDA Human Nutrition Research Center on Aging at Tufts University in Boston.

Elizabeth Krall and Bess Dawson-Hughes wanted to determine the degree to which inheritance and lifestyle figured into bone density. So they recruited 42 families—mother, father, adult daughter, and adult son—and measured them with DEXA, or dual energy x-ray absorptiometry.

DEXA not only measures bone density, it also “sees” and calculates the amount of body fat and lean tissue, which includes muscle, connective tissue, organs, and body water, as well as bone.

And what they found surprised them. “It’s a common perception that fatness tends to run in families,” says Krall. “But we found only a weak correlation among family members for body fat.”

Instead, they found a significant correlation in lean tissue—the bulk of which is muscle—between mothers and daughters, fathers and sons, and brothers and sisters. And that was after adjusting the statistical analysis for age, height, body fat, physical activity, and number of pregnancies among the women.

Accounting for these factors helps to even out comparisons between groups.

“The results suggest that there is more of an inheritance pattern for muscle and other lean tissue than for fat,” says Krall. She notes that the subjects ranged from thin to significantly overweight, but none were grossly obese. The inheritance factor may be stronger in the very obese.

This is one of a few studies to examine the heritability of lean tissue and the only one to focus on adult family members. Many studies have

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reported family similarities in fatness, Krall says. But most of these estimated rather than measured body fat using the inexact body mass index (BMI). Because the index is based on a person’s weight-to-height ratio, a muscle-laden athlete can have a BMI as high as someone who is quite obese.

For instance, the sons in this study averaged the same BMI as their mothers, she says, but their body fat levels were about one-half as much. The DEXA, on the other hand, gives a much more accurate value for body

fat, as well as for lean tissue and bone density—a good measure of bone strength.

Krall says there are two schools of thought on the heritability of body fat. One holds that fatness is almost completely determined by the genes. The other holds that lifestyle is also important: Eating and physical activity habits tend to run in families.

The findings suggest that lifestyle may explain the variability in body fat within families more than the variability in lean tissue. “It makes sense that lean tissue could be under more genetic control,” she notes. “There’s a limit to how much lean you can gain or lose. But dietary changes and physical activity can make big differences in body fat.”

As for the heritability of bone density, the researchers measured total body density and density at four specific sites—lower spine, hip, wrist, and heel—and found it to be similar within the families.

“We estimate that about 46 to 62 percent of the similarity in bone density in these families is through inheritance,” Krall says. “The rest is due to measurement error and the individual’s lifestyle.”

The heritability of bone density has been well documented, she adds.

What is not settled is whether bone density is determined more by how much muscle or by how much fat—or weight—one has. In these families, she says, bone density was associated with the amount of muscle, not fat. That’s more good reason for adding resistance training to the exercise regimen. By **Judy McBride, ARS.**

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